

Ministry of Agriculture and Rural Development  
VIETNAM DISASTER MANAGEMENT AUTHORITY

Disaster Management Policy and Technical Center

# SPACE TECHNOLOGY APPLICATION FOR DISASTER MANAGEMENT IN VIETNAM

Hanoi, Mar 21<sup>th</sup> 2018

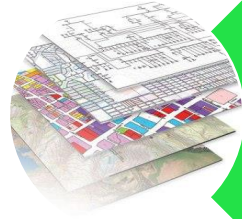
*Typhoon Tembin – Dec 24<sup>th</sup> 2017*

*Source: internet*

# Content:



Introduction



The initial result

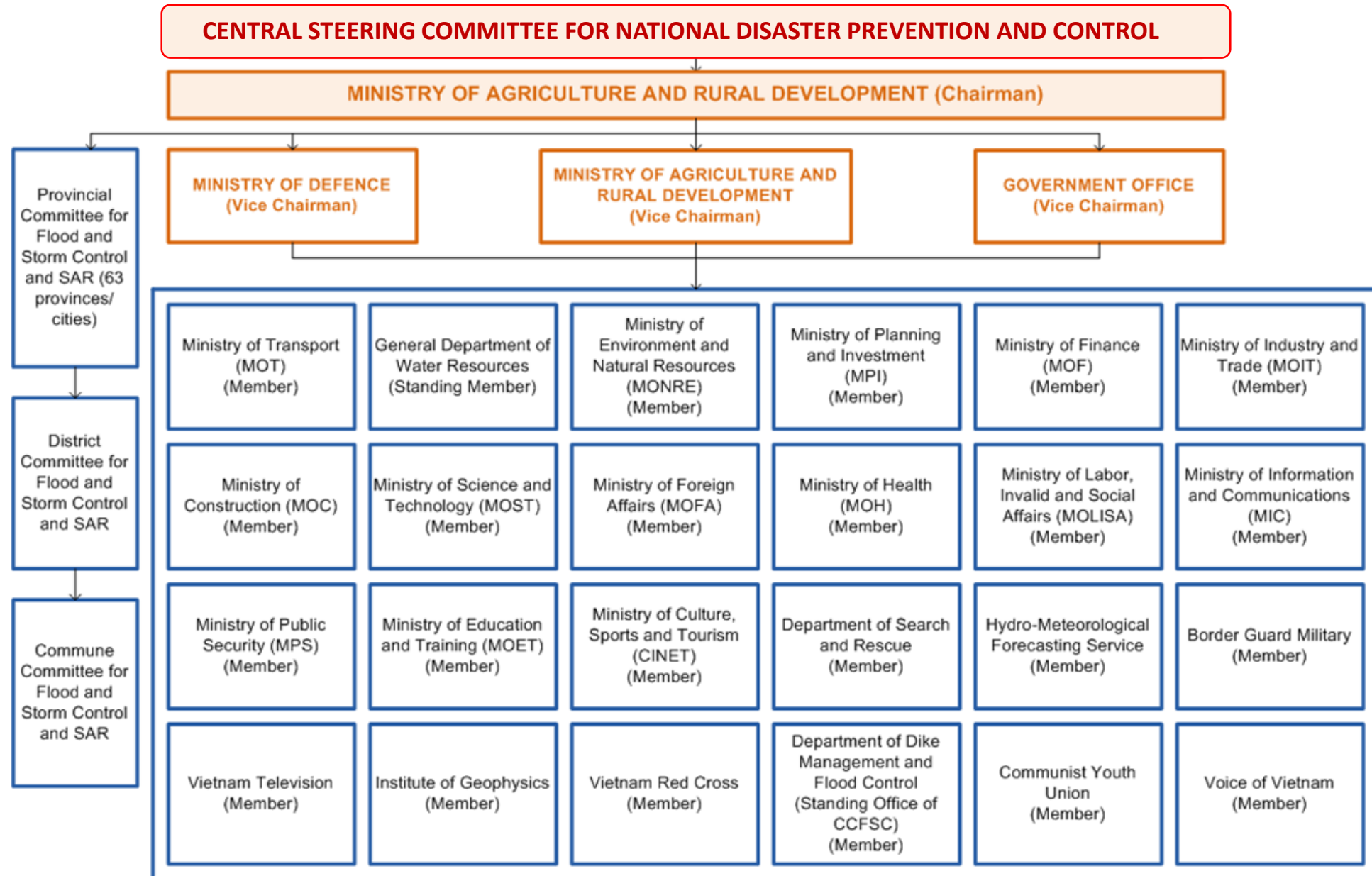


Recommendation

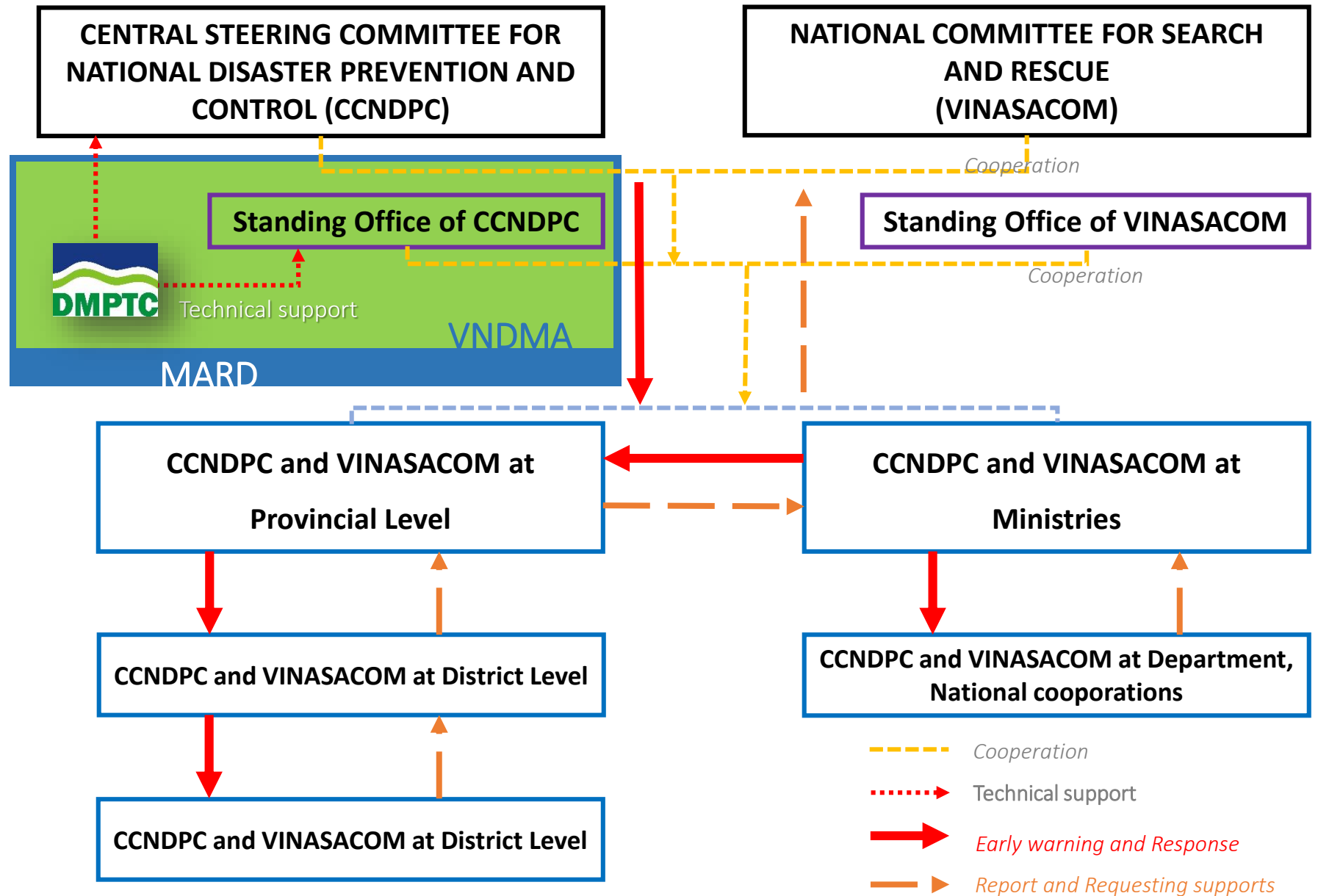
# INTRODUCTION

1. Disaster Management Center (DMC) had been established in 2010 by Prime Minister of Ministry of Agriculture and Rural Development (MARD).
2. The functions and mission of DMC had been regulated in the Decision as below:
  - At the Decision No. 14/QĐ – TCTL dated 31/3/2010 of the Director of Water Resource Directorate (WRD) - MARD
  - At the Decision No. 16/QĐ – TCTL dated 09/01/2015 of the Director of Water Resource Directorate (WRD) - MARD
  - At the Decision No. 19/QĐ – PCTT dated 18/8/2017 of the Director of Viet Nam Disaster Management Authority (VNDMA) - MARD
3. Main function: [Technical supporting](#) for VNDMA and Central Committee for Nature Disaster Prevention and Control (CCNDPC) for disaster management.

# Disaster management structure in Vietnam



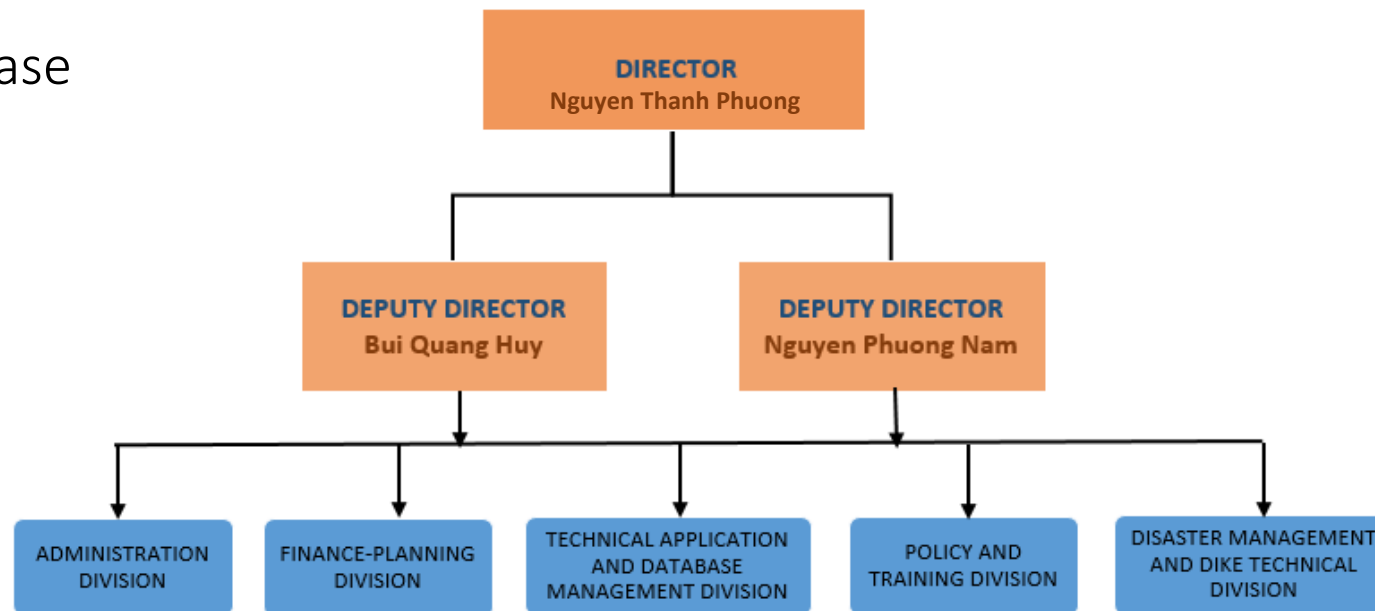
*DMPTC position  
in the Disaster  
Management  
Systems*



# Organization structure

## 05 Division

- Technical Application and Database Management Division
- Policy and Training Division
- Disaster Management and Dike Technical Division
- Administration Division
- Finance-Planning Division





# functions

1. To build, manage and exploit specialized databases on disaster management and dyke management and response to climate change, sea level rise under the management of the Authority.
2. To build, examine and verify disaster management plans; disaster response plans in line with disaster risk levels; strong and super typhoon response plans; emergency response plans in cases of floods exceeding design frequencies, dyke and dam failures or other emergencies that might occur; reservoir operation and regulation; dyke management maps, flood maps and other maps which serve disaster management and response to climate change, sea level rise.
3. To conduct observation, monitoring, basic investigation, baseline assessment, scientific and technical researches; to build pilot models and works using new building materials, applying information and remote sensing technology; applying, testing and transferring new technologies and scientific and technological advances in disaster risk management and response to climate change, sea level rise.
4. To co-operate with domestic and international organizations and agencies in technical cooperation, applying information technologies and geo-space information technologies, sharing information and experiences on disaster risk management and response to climate change, sea level rise according to legislation.
5. Policy consultant and guidance on safety, environment, gender mainstreaming and integrate vulnerable subjects, analyze and evaluate the impacts of policies in the field in the field of natural disaster prevention and control and cope with climate change, sea level rise
6. Developing investment projects, designing construction works on dike, riverbank protection works, flood drainage, disaster warning works, storm shelters for vessel and works, technical infrastructure related to dykes, natural disaster prevention (bridge, port, road ...). Survey, investigation and collect data on terrain, geology, hydrology, marine for disaster prevention, dyke, response to climate change, sea level rise and construction investment consultancy, planning.

# Milestones of applying space technology in Vietnam

Present &  
further

2017

- Cooperation to organization the 10 years anniversary workshop and the 4<sup>th</sup> JPTM meeting in Hanoi (2017)

2016

- 4<sup>th</sup>: Request/ activation SA: for two flood event in October & November, 2016 in the central area of Vietnam.
- 3<sup>rd</sup>: Request / activation SA: **DMC** collaborated with **STI** for processing, mapping, survey and report (BIG DROUGHT 10-11/2016, Central Coastal province of Viet Nam)
- 2<sup>nd</sup> : Request / activation SA: **DMC** collaborated with **STI** for processing, mapping, survey and report (BIG DROUGHT 2015-2016, Central Highland of Viet Nam)

2015

- **Sign MOU between JAXA, WRD, VAST** (September 2015); Building Implementation plans for 3 years of MOU

2014

- JAXA & Disaster Charter: 1<sup>st</sup> Request / activation: Collected Data, products from Sentinel Asia, Disaster Charter, Vietnamese DANs, AIT, Tokyo University. **DMC** collaborated with **STI** for processing, mapping, survey and report (BIG Flooding 2014, Quang Ninh province)
- **UNSPIDER and GITA'** technical Advisory Group to Vietnam (September 2014)

2013

- **UN-SPIDER** Technical Advisory Mission to Vietnam (March 2013)



# UN-SPIDER Technical Advisory Mission to Vietnam – Mar 2013



# Memorandum of Understanding signing ceremony – Sep 2015

## (WRD) – (MARD) & (VAST) & (JAXA)

The Parties cooperate and make efforts on the following activities;

- ☐ Development of a database system by past satellite imageries of Vietnam for disaster prevention.
- ☐ Exchange of satellite data when disaster happens.  
*(JAXA will provide satellite data owned by JAXA, such as, including but not limited to, ALOS-2 data for WRD and/or VAST upon request of WRD and/or VAST through Sentinel Asia. VAST will provide satellite data owned by VAST, such as, including but not limited to, VNREDSat, for Sentinel Asia Step 3 Activities..)*
- ☐ Strengthening the capacity of application of remote sensing and GIS technology for disaster prevention in Vietnam.
- ☐ Development of programs and projects on application of remote sensing and GIS technologies for disaster prevention.

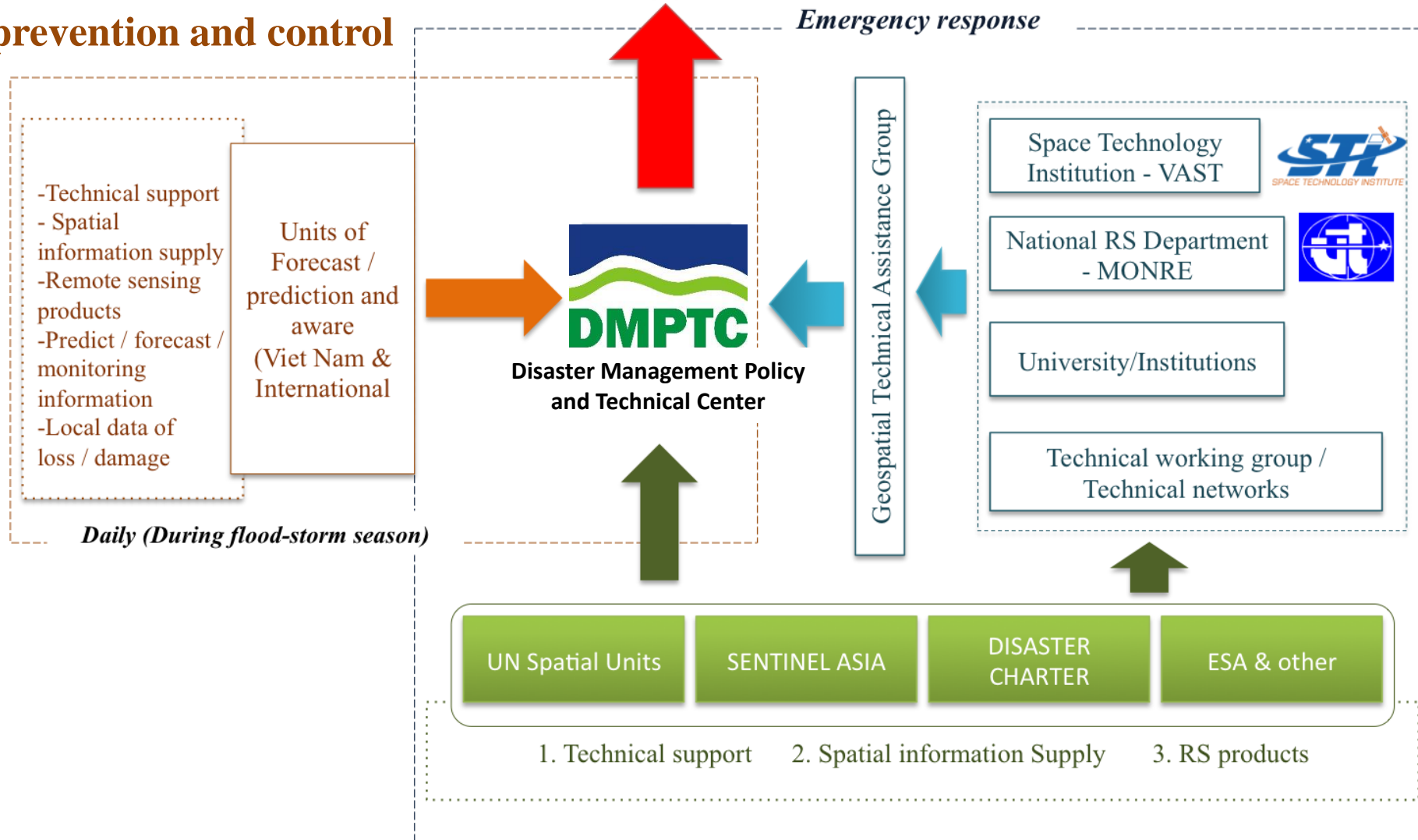


*According to the MoU, DMC will be the focal point of WRD in this activities and STI will be the focal point of VAST.*

**The structure for receipt RS and GIS to serve for disaster prevention and control**



**Standing Office of National Committee for Disaster prevention and Control**



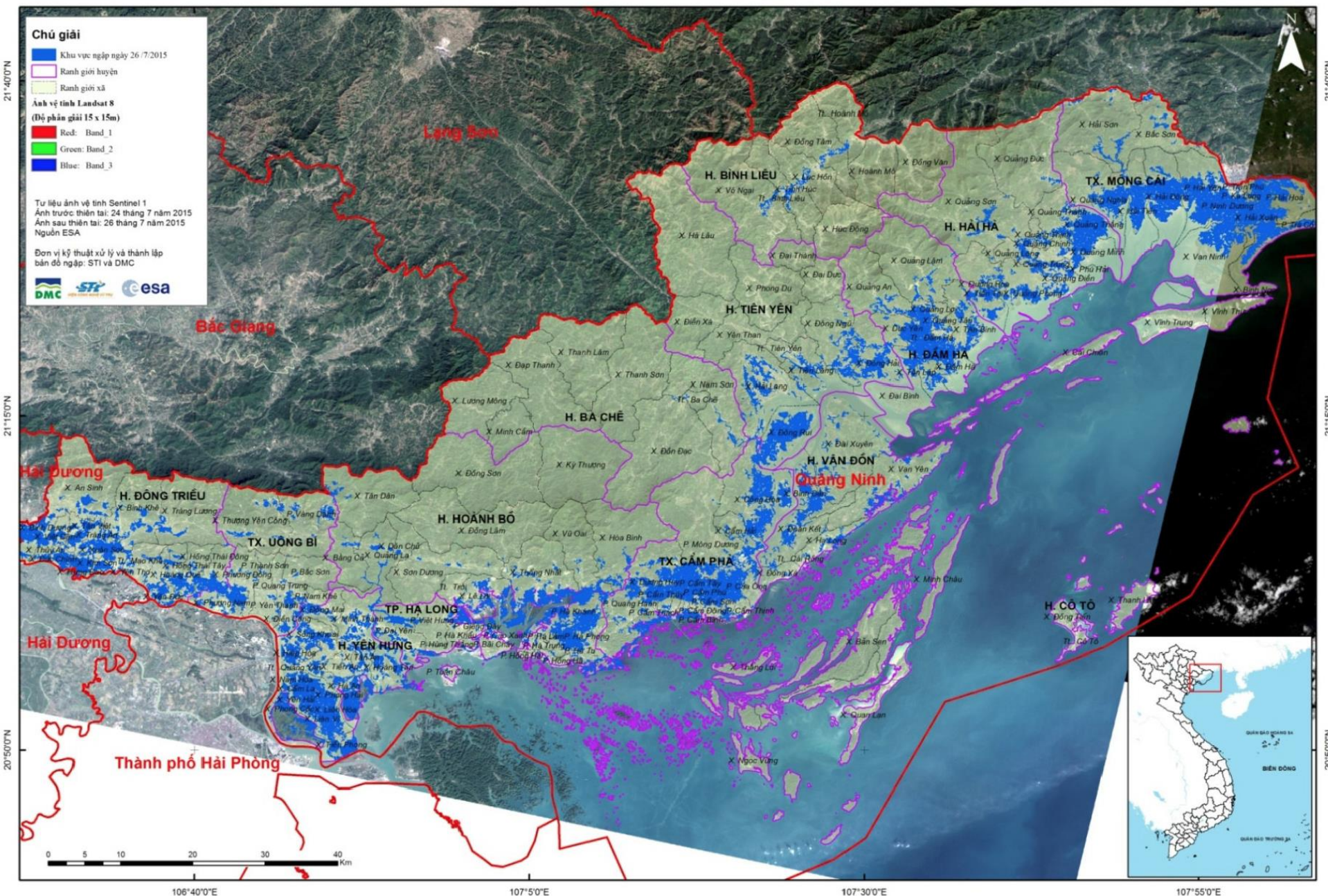


# THE INNITIAL RESULT

- Emergency response for Flood disaster on 2015

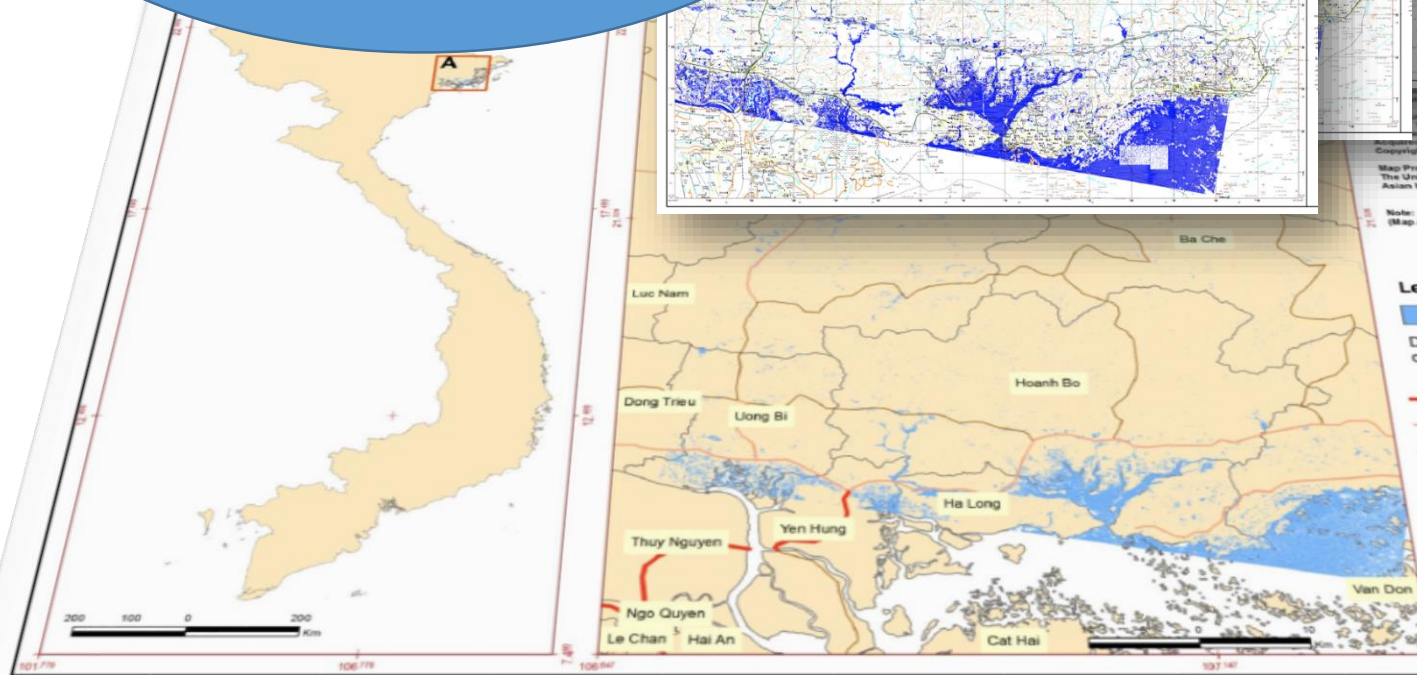
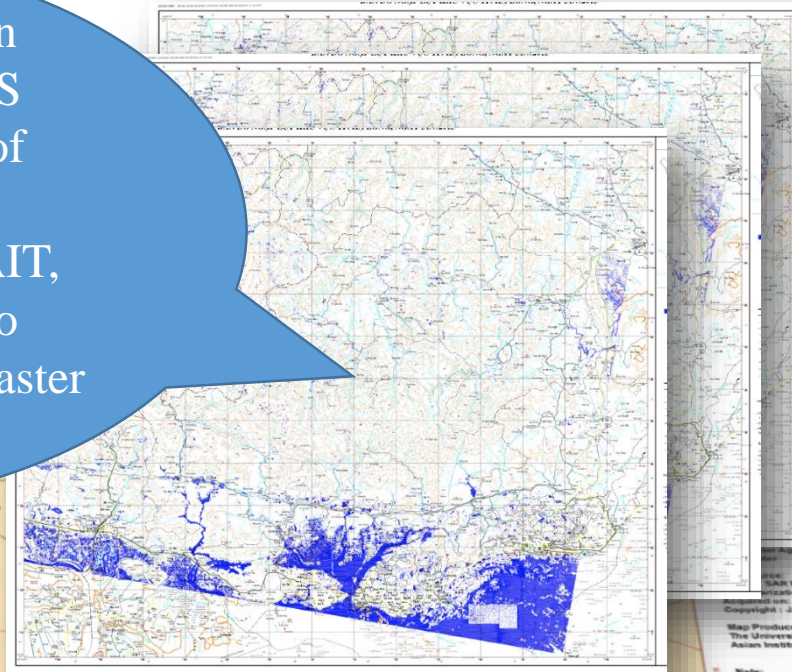
## Inundation map in Quang Ninh province, 26/7/2015.

DMPTC and Spatial Technology Institution (STI) had cooperated in developing inundation map by heavy rain in Quang Ninh province (26/7/2015) using satellite image of Sentinel 1 (SAR)





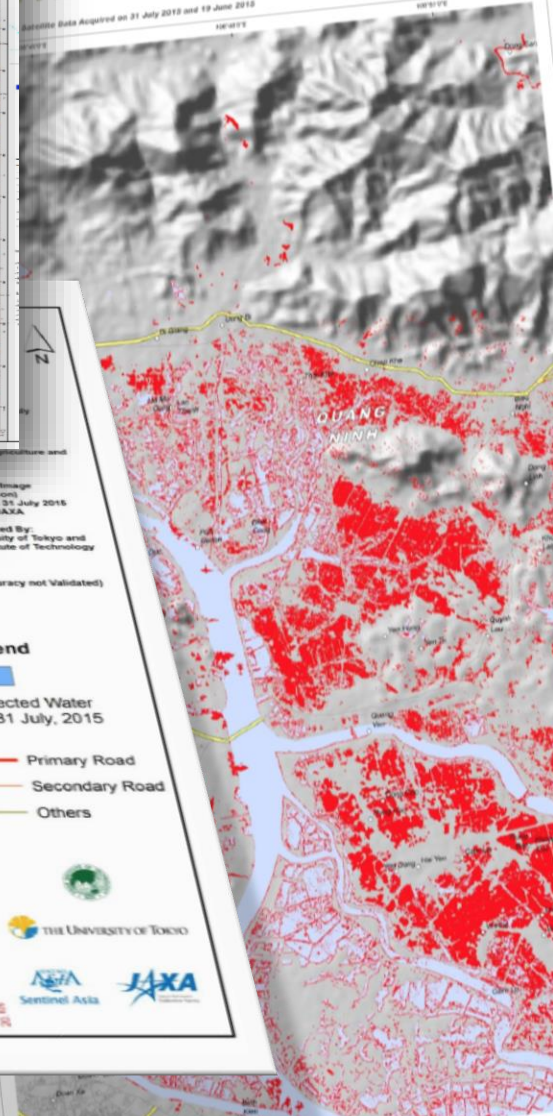
Inundation Map had been produced by National RS Department of Ministry of Natural Resources and Environment (MONRE), AIT, UNOSAT for reporting to National Committee for Disaster Prevention and Control



- Legend**
- Detected Water on 31 July, 2015
  - Primary Road
  - Secondary Road
  - Others



## OF FLOOD WATERS PHONG CITY, VIETNAM



**Flooding**

Product Date: 04/08/2015  
Version: 1.0  
Data Number: FL-2015-00006-VNM

This map gives an overview of satellite detected waters in Dong Lach Thap area near the Phong City in northern Vietnam. Due to continuous rain, there is a notable increase in inundated fields along the coast in the Phong and Quang Nam Provinces. In the analyzed area, approximately 30,000 hectares of land has been classified as flood affected. Many identified flooded regions are in close proximity to the Long Bay in Gulf of Tonkin, a UNESCO World Heritage Site. This is a preliminary analysis and has not yet been validated in the field. Please send ground feedback to UNITAR/UNOSAT.

**Legend**

- Populated Place
- Highway/Primary Road
- Secondary Road

**FLOOD WATER EXTENT ANALYSIS**

Legend: Flood Waters  
Flooded Area: 31 July 2015  
Flooded Area: 19 June 2015

Map Scale for A1: 1:60,000

Sensing Data (1): ALOS-2/PALSAR-2  
Sensing Date: 31 July 2015  
Resolution: 8.35 m  
Copyright: JAXA  
Source: JAXA  
Sensing Data (2): ALOS-2/PALSAR-2  
Sensing Date: 19 June 2015  
Resolution: 8.35 m  
Copyright: JAXA  
Source: JAXA  
Road Data: OpenStreetMap  
Other Data: USGS, NASA, NOAA  
Analysis: UNITAR / UNOSAT  
Production: UNITAR / UNOSAT  
Processing: UNOSAT v10.3  
Antenna: UNOSAT v10.3

Coordinate System: WGS 1984 UTM Zone 48N  
Projection: Transverse Mercator  
Datum: WGS 1984  
Units: Meter

The depiction and use of boundaries, geographic names and related data shown here are not warranted to be accurate nor do they reflect endorsement or acceptance by the United Nations. UNOSAT is a program of the United Nations Institute for Training and Research (UNITAR), providing satellite imagery and related geographic information, disaster management and analysis to UN humanitarian and development agencies and their implementing partners.

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**unitar**  
**UNOSAT**  
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Tel: +41 79 467 4999  
[www.unosat.org](http://www.unosat.org)



# THE INNITIAL RESULT

- Response for drought disaster on 2016

# Results

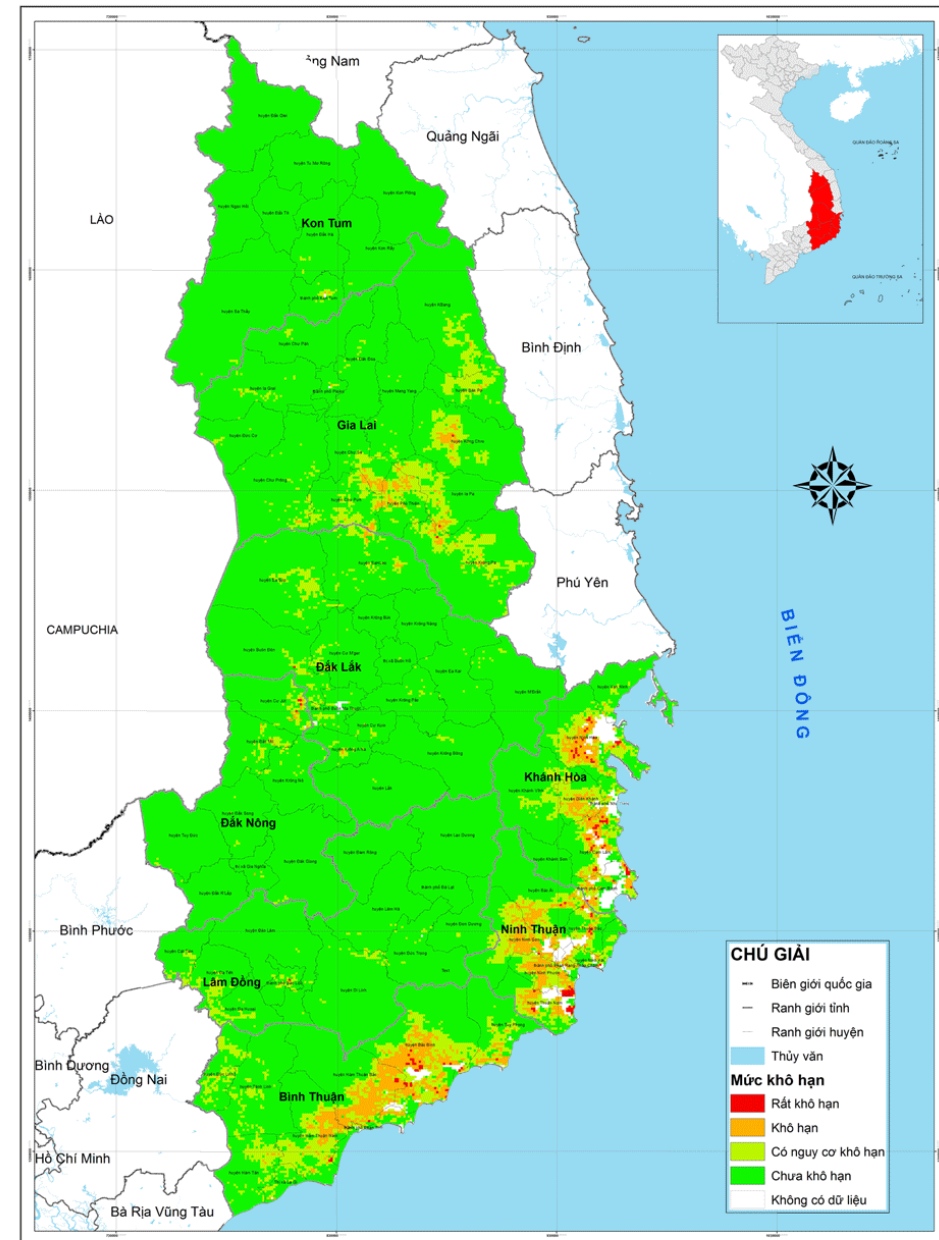
## from MODIS satellite images



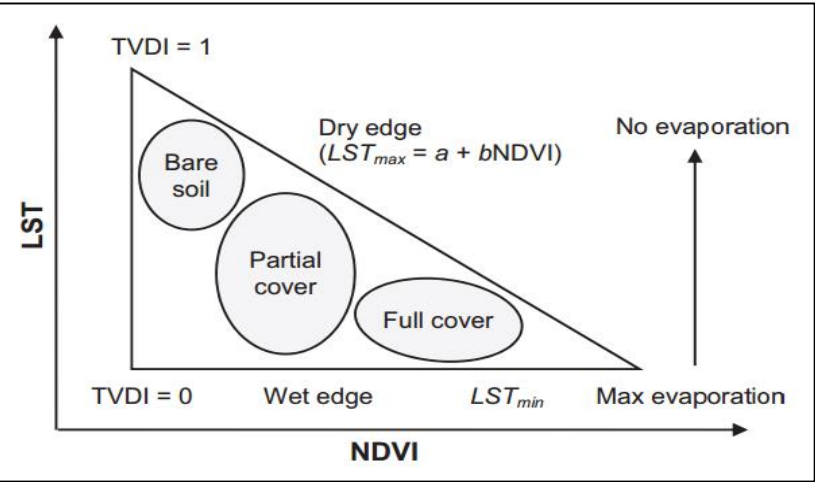
(adapted from Mauro E. Hořman và Raúl E. Rivas, 2015)

Drought level	TVDI value	Warning color
Severe drought	0,7 – 1	Red
Moderate drought	0,55 – 0,7	Orange
Slight drought	0,4 – 0,55	Yellow
Normal	< 0,4	Green

BẢN ĐỒ KHÔ HẠN NGÀY TRUNG BÌNH THÁNG 9 NĂM 2015

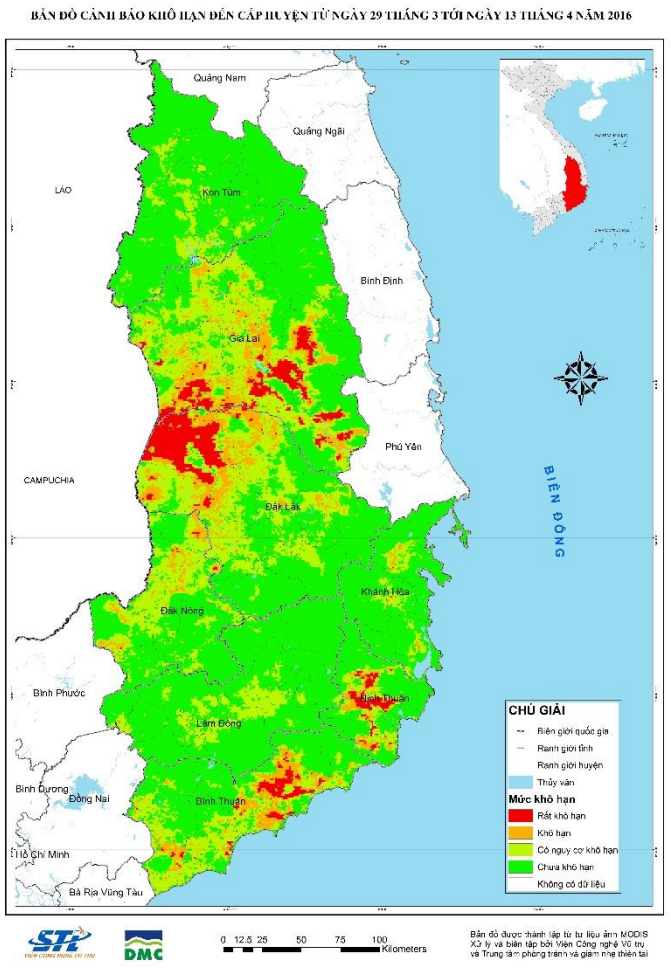
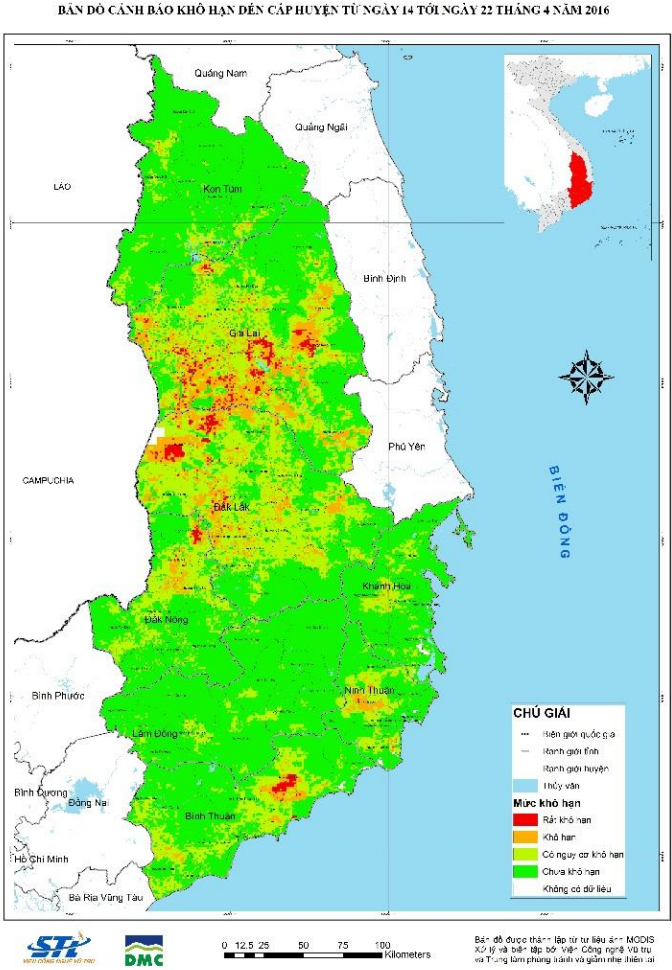


Drought map of Highland area and South Central area on 2015.



(adapted from Mauro E. Hořzman và Raúl E. Rivas, 2015)

Drought level	TVDI value	Warning color
Severe drought	0,7 – 1	
Moderate drought	0,55 – 0,7	
Slight drought	0,4 – 0,55	
Normal	< 0,4	

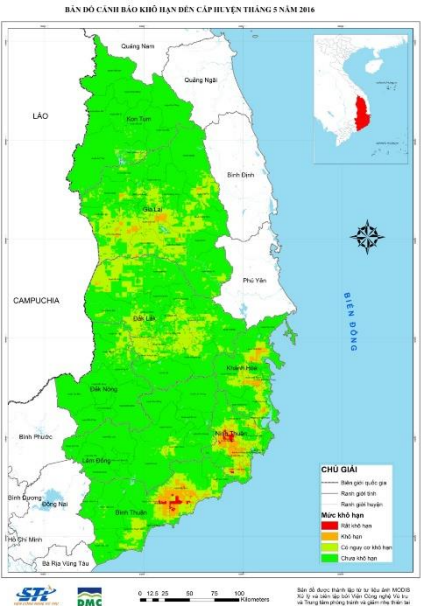
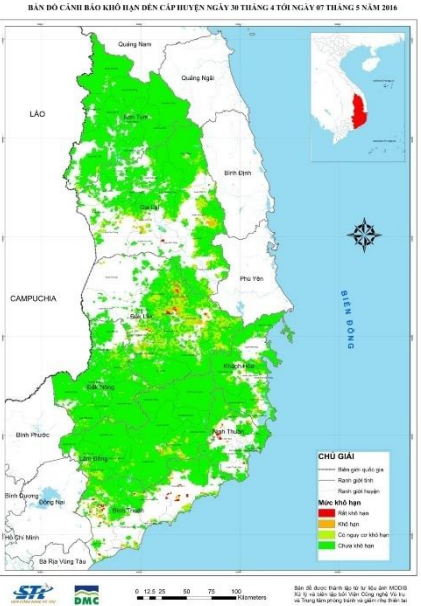
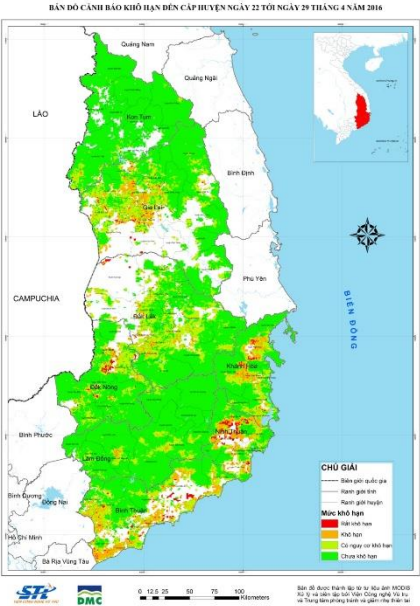
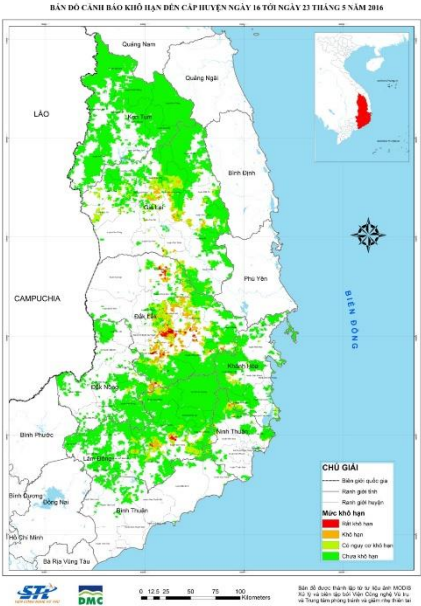
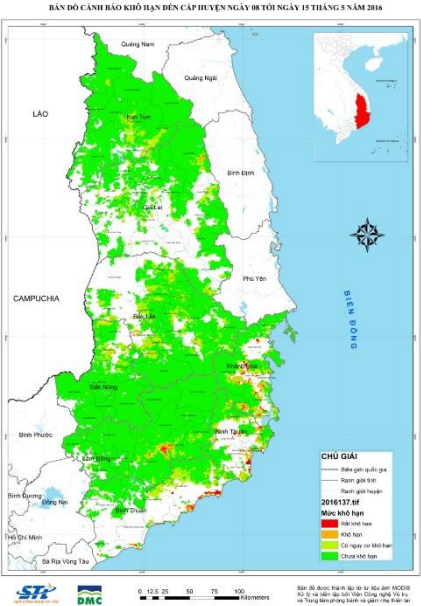


STI and DMC cooperation to produced the drought map for 5 provinces in Highland area and Ninh Thuan, Binh Thuan, Binh Dinh provinces.

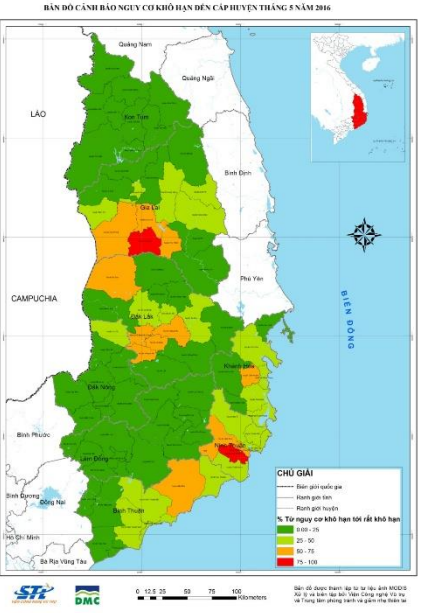
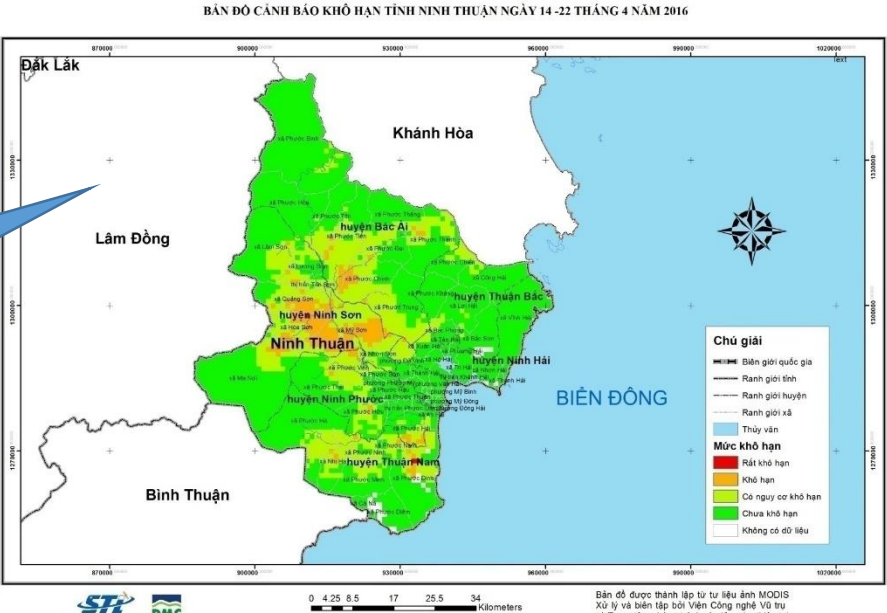


Drought on May and June, 2016

Province scale



District scale

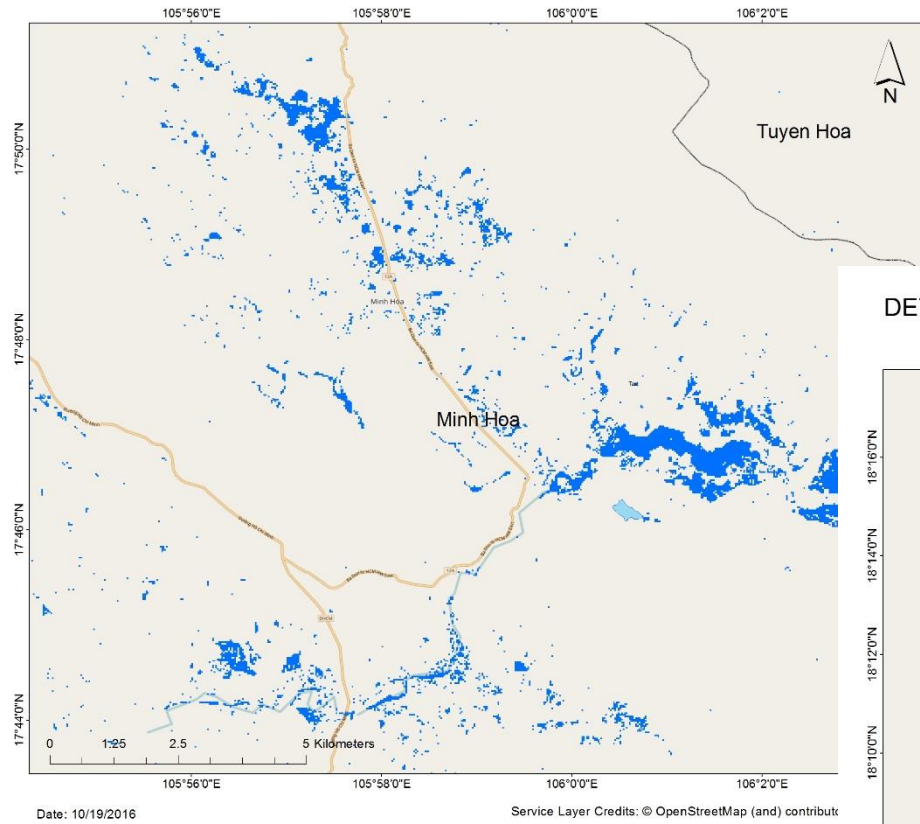


Drought risk maps (5 levels)

# THE INNITIAL RESULT

- Emergency response for Flood disaster on 2016

DETECTED WATER IN MINH HOA DISTRICT, QUAN BINH PROVINCE, VIETNAM (16 OCT 2016)



Date: 10/19/2016

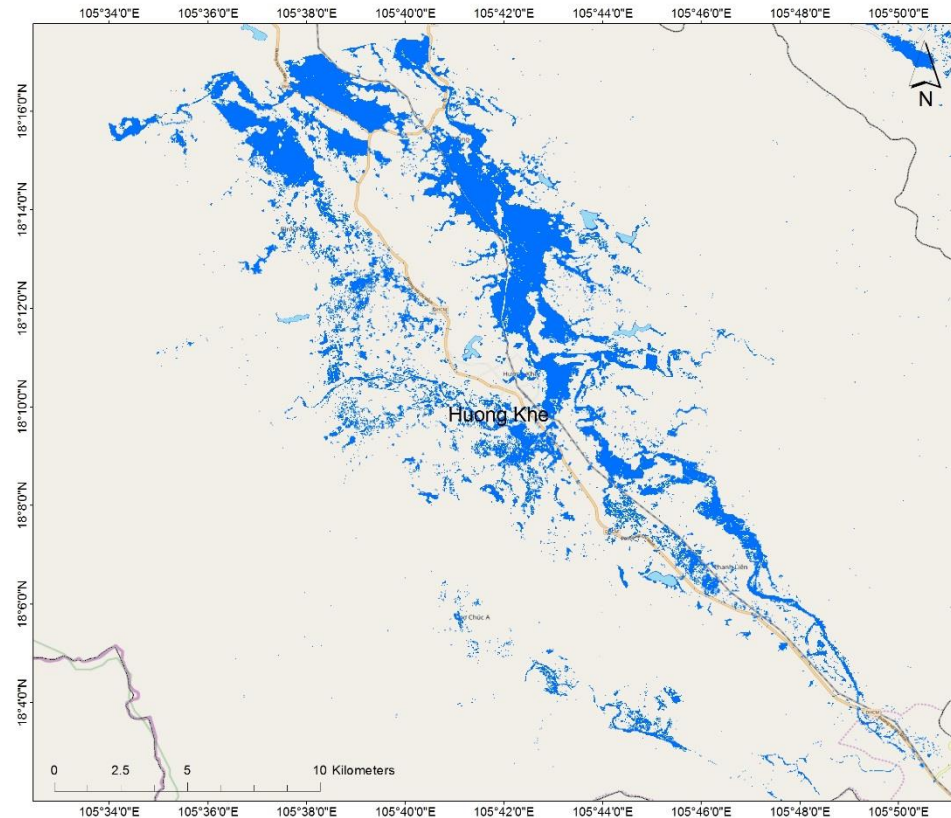
Service Layer Credits: © OpenStreetMap (and) contribut



Legend

Detected Water

DETECTED WATER IN HUONG KHE DISTRICT, HA TINH PROVINCE, VIETNAM (16 OCT 2016)



Date: 10/19/2016

Service Layer Credits: © OpenStreetMap (and) contributors, CC-BY-SA



Legend

Detected Water

MAP SCALE 1:60,000

POST-DISASTER IMAGE

Satellite/ Sensor: ALOS-2/ PALSAR-2

Date: 16 Oct 2016

© JAXA

Coordinate System: GCS\_WGS\_84

Datum: D\_WGS\_84

Unit: Degree

This map shows detected water area in Huong Khe district, Quan Binh province, Vietnam as observed from ALOS-2 data on 16 October 2014. Image processing using thresholding technique was applied to extract the water area.

Disclaimer: The accuracy of this product is not validated.



October 2016

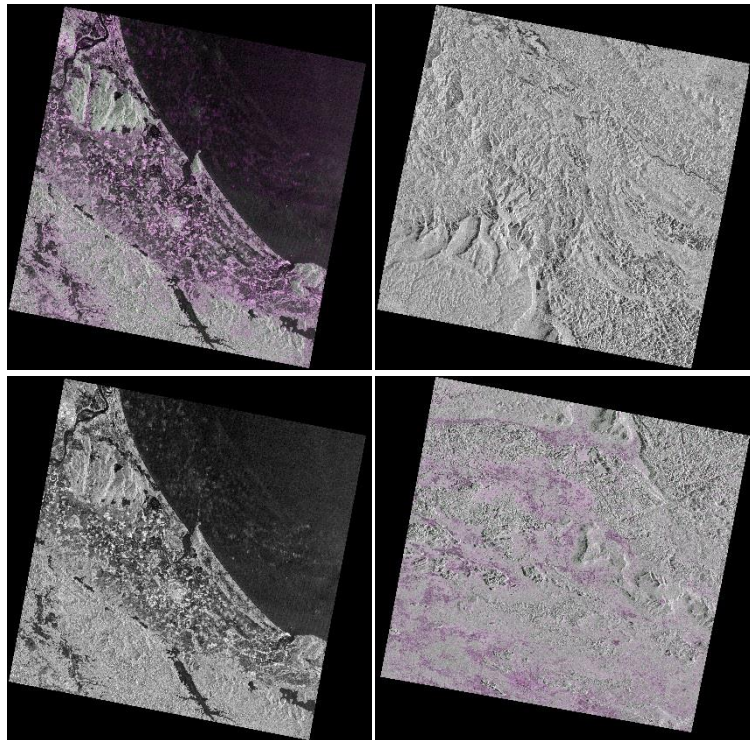
DMPTC & STI requested Sentinel Asia  
AIT processed



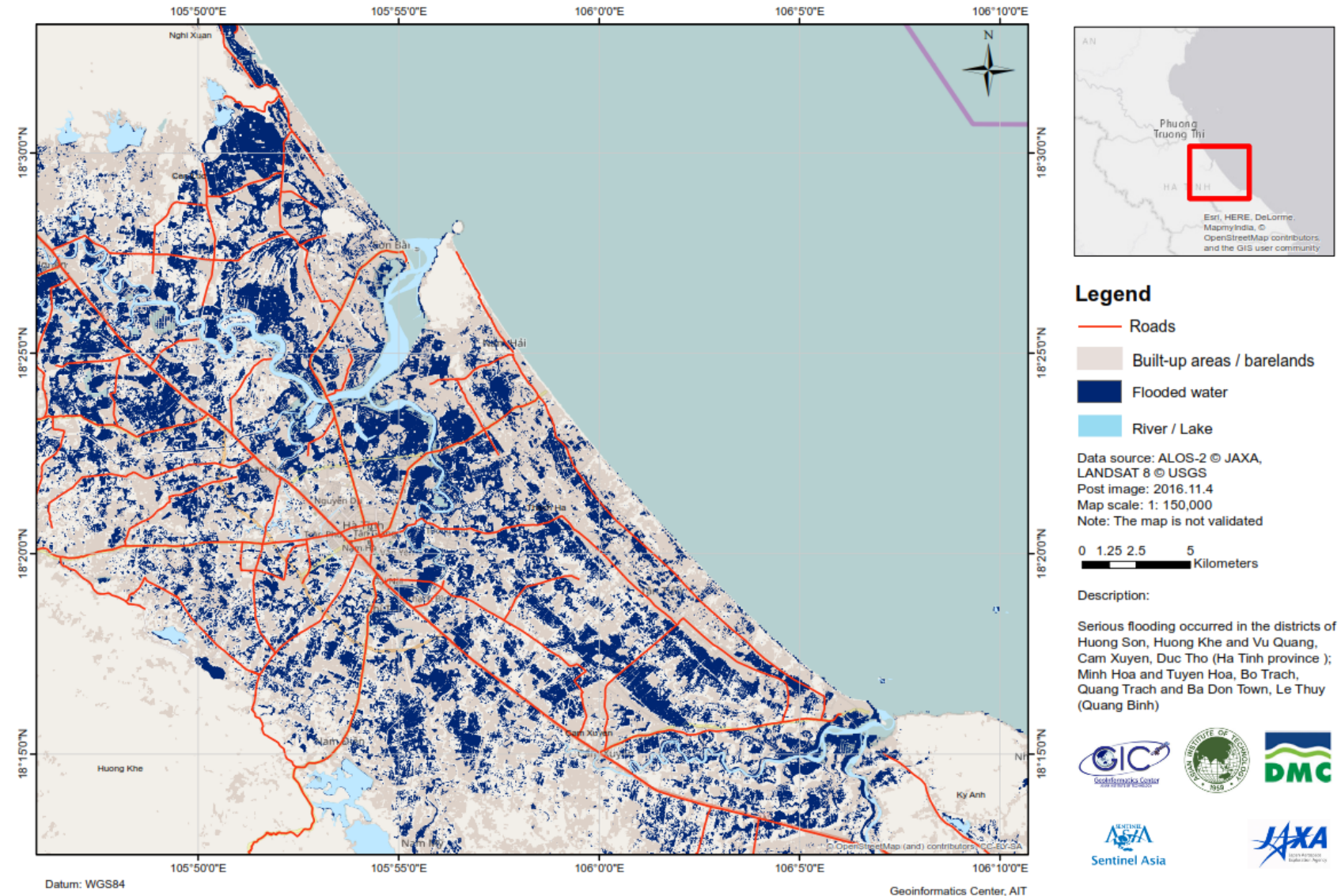
# November 2016

## DMPTC & STI requested Sentinel Asia

### AIT processed

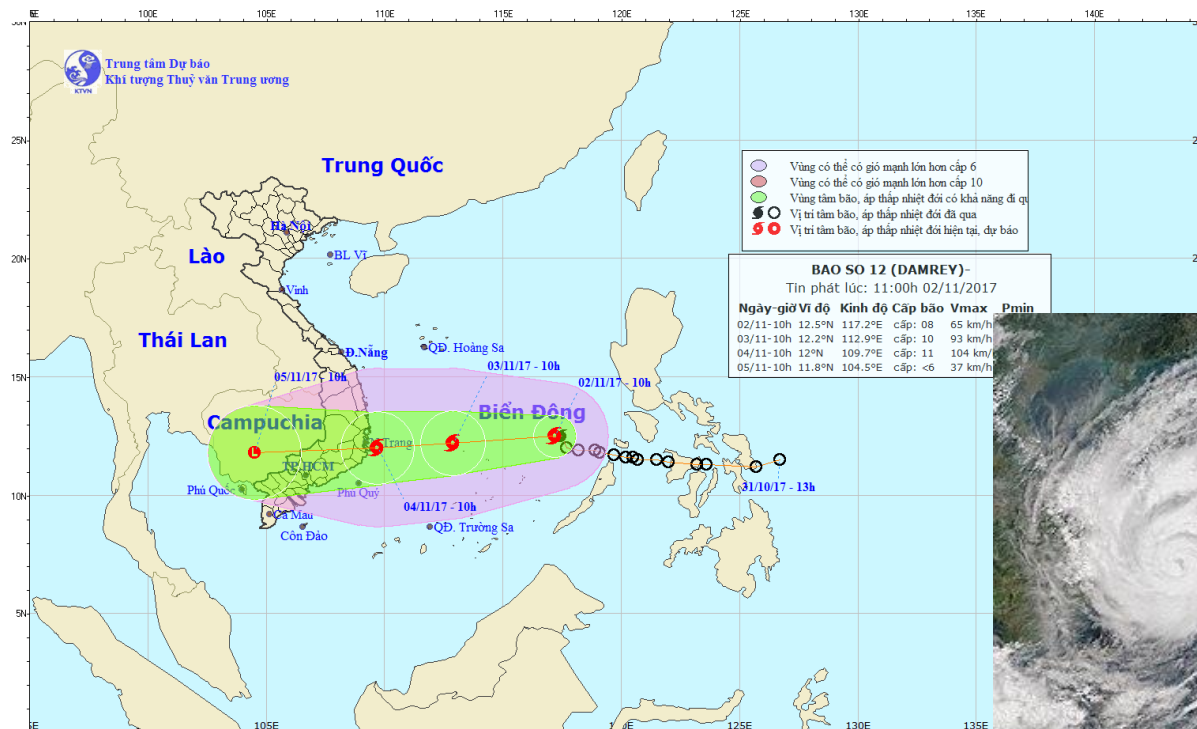


Map 1.1 : Existing Water Detected by ALOS-2/PALSAR-2 Images observed on 04/11/16 in Central of Vietnam



# THE INNITIAL RESULT

- Emergency response for Damrey storm (Storm No 12) on Nov 2017:



Report form CCNDPC on Nov 11<sup>th</sup> 2017:

- People die: 44
- People lost: 19
- House damage: 116.224





**FLOODING IN KHANH HOA PROVINCE, VIETNAM**  
 As observed by ALOS-2 image on 7 November 2017

**Map Information**

0 3 6 9 12  
Kilometers

**MAP SCALE 1:100,000 at A1 PRINT**  
 Coordinate System: GCS WGS 84  
 Datum: D WGS 84  
 Unit: Degree

**Legend**

- Province Boundary
- District Boundary
- Existing Water Bodies
- Flood Proxy Map

**Data Sources**

Satellite image:  
 Pre-disaster : ALOS-2, 10 October 2017  
 Post-disaster : ALOS-2, 7 November 2017  
 Copyright : © JAXA (2017) - All rights reserved.

GIS data:  
 River, Water bodies © OSM 2017  
 Administrative boundary © GADM  
 Service Layer Credits: Sources: Esri, HERE, DeLorme, Intermap, increment P Corp., GEBCO, USGS, FAO,

**Description**

This map shows Flood Proxy Map showing areas likely flooded in Khanh Hoa Province, especially in Ninh Hoa and Van Ninh district. Note that the floodwater may also include water in paddy area.

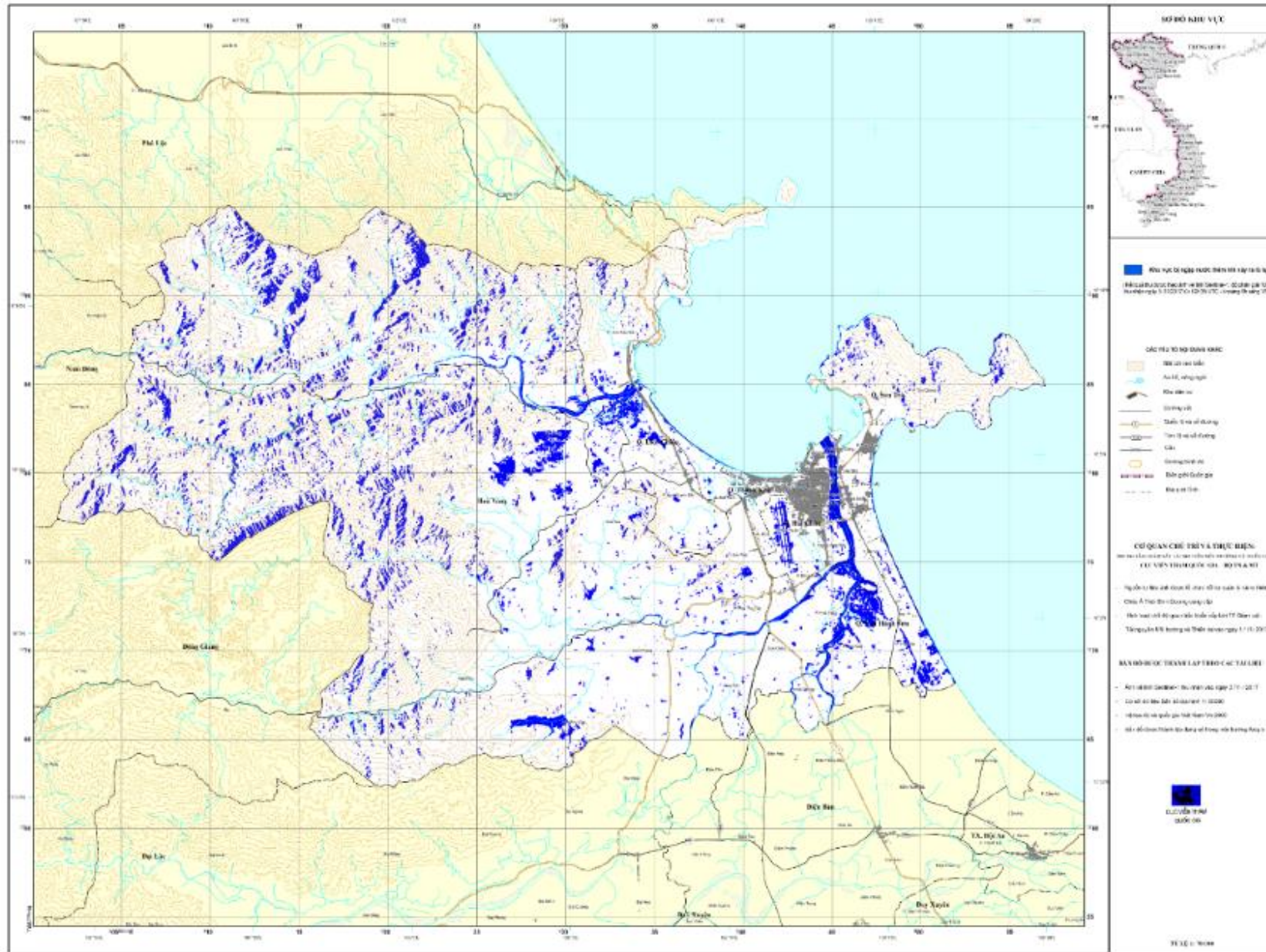
Map product made by GIC-AIT (v1.0).  
 Disclaimer: The accuracy of this product is not validated.

Data provider:

Flooding map in Khanh Hoa province using Alos 2 on Nov 7<sup>th</sup> 2017. Product made by GIC-AIT.



**BẢN ĐỒ GIÁM SÁT NHANH HIỆN TRẠNG NGẬP LỤT**  
**KHU VỰC TỈNH ĐÀ NẴNG NGÀY 3/11/2017**

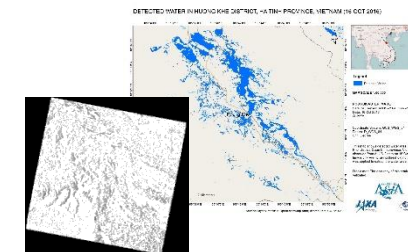


Flooding map in Da Nang city using Sentinel-1 on Nov 3<sup>th</sup> 2017.  
 Product made by Centre for Monitoring of Environmental resources and Natural disasters – Department of National Remote sensing - MONRE

# Advantage and disadvantage

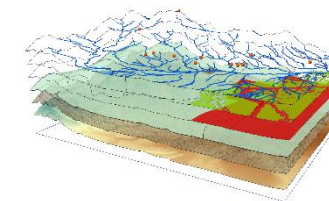
## Advantage

- ✓ MARD and VNDMA would like to improve the applying of space technology in DDR
- ✓ DMPTC had been connected to Sentinel Asia and International Charter system
- ✓ DMPTC had technical officer with the knowledge about DRR system and Remote Sensing and GIS
- ✓ Strongly supports from STI, AIT, Sentinel Asia; and UN-Spider



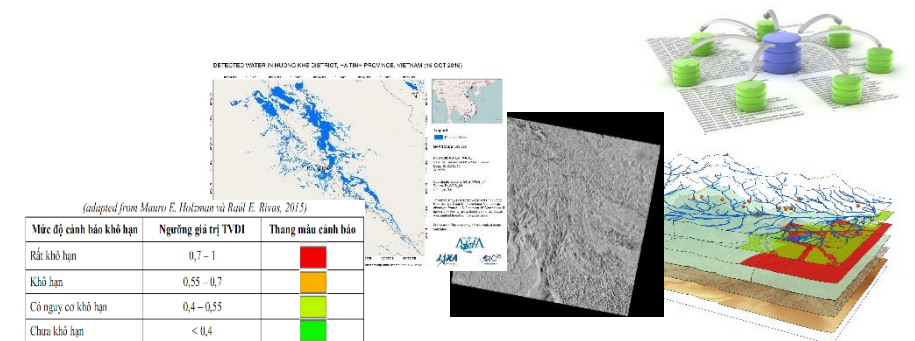
## Disadvantage

- There are still have no SOP for applying space technology in DRR, especial in emergency response
- The officer need more technical training for space technology, advanced technique on how to use space technology in case of emergency response.
- Need building the database that include base map and other geographical maps to serve for disaster management.



# RECOMMENDATION

- It should have SOP and clear responsibilities for each participate site: provider, user and technical analysis.
- Sharing method to quick delivery satellite images and products to end user in case of disaster occur, especial is emergency response.
- Research on building the remote sensing database to serve for disaster management or portal library to quick sharing product, data between Vietnam technical organization belong to DANs, PDANs, Node... and other disaster organization.





**THE END**

**THANK YOU FOR LISTENING**

